PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WEI-P001WO	**FOR FURTHER ACTION** See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP 03/06689	International filing date *(day/month/year)* 25.06.2003	Priority date *(day/month/year)* 25.06.2003
International Patent Classification (IPC) or both national classification and IPC G08G1/01		
Applicant WEIS, Julian et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
15.05.2004	02.02.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Coffa, A Telephone No. +49 89 2399-7107

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/06689

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

4-19	as originally filed
1-3, 3a	received on 11.12.2004 with letter of 10.12.2004

Claims, Numbers

1-8	received on 11.12.2004 with letter of 10.12.2004

Drawings, Sheets

1/23-23/23	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-8
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-8
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents, which were cited in the international search report :

   D1: US 2002/030611 A1 (VOGEL PETER ET AL) 14 March 2002 (2002-03-14)
   D2: US 2002/150050 A1 (NATHANSON MARTIN D) 17 October 2002 (2002-10-17)
   D3: US-A-5 173 691 (SUMNER ROY L) 22 December 1992 (1992-12-22)

2. Claim 1
   D1 discloses "a device for exchanging data between moving vehicles " which in essence corresponds to the device of claim 1. Claim 1 differs from the disclosure of D1 by the following features (a) - (c) :

   " further including

   (a) a route map skeleton generator and
   (b) a route map skeleton extractor for generating route location data
   (c) extracted from synthesis data messages "

   The subject-matter of **claim 1 is therefore novel (Article 33(2) PCT).**

   The problem to be solved may therefore be regarded as :

   " enhancing the accuracy of the route location data "

   The solution to this problem proposed in claim 1 of the present application is considered as involving **an inventive step (Article 33(3) PCT)** for the following reason: The combination of technical features (a) - (c) leads to a device which uses an alternative method for enhancing the accuracy of the route location data which has neither been disclosed nor suggested by the prior art (D1-D3).

3. Claims 2-8
   Claims 2-8 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

A device for exchanging data between moving vehicles

The invention relates to a device for exchanging data between moving vehicles comprising a receiving module for receiving data messages broadcasted from other vehicles equipped with said device, sensing and processing means for generating vehicle-specific data and a broadcasting module for broadcasting data messages including said received data and said vehicle-specific data, whereby the device further includes data processing means inseparably combining corresponding data from said received data and from said vehicle-specific data to synthesis data messages comprising time stamp data, whereby the broadcasting module is adapted to broadcast said synthesis data messages and whereby said data processing means include at least one evaluation member for evaluating the contribution of received synthesis data messages according to said time stamp data.

A device of the above kind is known from document US-A1-2002030611 for performing a method for transmitting data packets between motor vehicles includes transmitting individual data packets including vehicle data and generation data for the individual data packets. Other motor vehicles may combine the individual data packets into combined data packets and transmit them. The data packets may include fields, each of which may include data-packet generation data and vehicle data to allow processing to be performed in the transmitting/receiving stations in motor vehicles. Permanently installed radio stations allow a main station to supply information columns at clearly defined

points with traffic information to inform users outside of the roads.

A further device in this technical field is known from document US-A-5,428,544. This device comprises a receiving module for receiving data messages broadcasted from moving vehicles equipped with said device. A displacement sensor and a direction sensor of sensing means are connected to a microcomputer including processing means for generating vehicle-specific data of a vehicle equipped with said device. The known device furthermore comprises a passing-by-vehicle information register for storing received data messages broadcasted from other vehicles. A self-information register of the microcomputer is adapted to store the vehicle-specific data generated by the sensing means. A transmitter is connected to the passing-by-vehicle information register and the self-information register and is adapted to broadcast data messages including said received data and said vehicle-specific data.

The device according to document US-A-5,428,544 is adapted to generate vehicle-specific data of the vehicle equipped with said device, to receive data broadcasted from other vehicles equipped with said device and to broadcast the self-generated vehicle-specific data and the received data to other vehicles. Therefore, the known device serves as a relay station for the received data. However, the above-mentioned device has the drawback that the received data may be used to trace the track of an individual vehicle which may cause some problems with respect to the privacy of the user of the specific vehicle. Furthermore, the received data are unspecific with respect to relevance.

Therefore, the present invention seeks to further improve a device of the above-mentioned kind in such a way that the accuracy is enhanced.

In accordance with the invention, this object is accomplished by a device of the above kind further including a route map skeleton generator and a route map skeleton extractor for generating route location data extracted from synthesis data messages.

By generating route location data on the basis of vehicle-specific synthesis data and received synthesis data including route location data from further vehicles the accuracy of the position data and especially of the route location data are considerably enhanced beyond the accuracy of the positioning data which are about 10 meters. By overlaying a multitude of position data and applying an algorithm implemented in the route map skeleton generator disregarding strongly deviating position data and calculating mean position data on the basis of the remaining position data an accuracy of the position data of about 1 meter or less may be achieved. Therefore, the route location data of high accuracy may be used for further processing of synthesis data as reference or as basis for further improvement of the route location data.

Further preferred embodiments and advantages of the invention are included in the dependent claims.

The invention will be described by way of example on the basis of a specific embodiment accompanied by the drawings, in which

~~3/1~~ 3a

Fig. 1	shows in a block diagram the main functional elements of an embodiment of the present invention,
Fig. 2	shows in a diagram a track of a moving vehicle equipped with a device according to the present invention,
Fig. 3	shows in the block diagram a sensing module and track-related elements of a map synthesis module of the embodiment of Fig. 1,
Fig. 4 to Fig. 6	show in block diagrams elements of a receiving module of the embodiment of Fig. 1,
Fig. 7	shows in the block diagram the fundamental functioning of a map processing unit of the embodiment of Fig. 1,
Fig. 8 and Fig. 9	show in block diagrams a map preprocessing module of the embodiment of Fig. 1,
Fig. 10 to Fig. 13	show in block diagrams synthesis related elements of the map synthesis module of the embodiment of Fig. 1,

CLAIMS

1. A device for exchanging data between moving vehicles (19) comprising a receiving module (4) for receiving data messages broadcasted from other vehicles (19) equipped with said device, sensing and processing means (6, 9, 15) for generating vehicle-specific data and a broadcasting module (5) for broadcasting data messages including said received data and said vehicle-specific data, whereby the device further includes data processing means (16, 17) inseparably combining corresponding data from said received data and from said vehicle-specific data to synthesis data messages comprising time stamp data, whereby the broadcasting module (5, 126) is adapted to broadcast said synthesis data messages and whereby said data processing means (15, 16) include at least one evaluation member (66, 73, 78, 79, 80, 81, 82, 83) for evaluating the contribution of received synthesis data messages according to said time stamp data, **characterized by** further including a route map skeleton generator (132) and a route map skeleton extractor (136) for generating route location data extracted from synthesis data messages.

2. A device according to claim 1, characterized in that the at least one evaluation member (66, 73, 78, 79, 80, 81, 82, 83) attributes a higher evaluation value for more recent received synthesis data and lower evaluation value for older received synthesis data.

3. A device according to claim 1 or claim 2, characterized by further including a stochastic process controller (104) com-

prising at least one stochastic time generator (105, 106, 107) for rescheduling synthesis data messages upon receipt of activity signals of the receiving module (104, 125).

4. A device according to one of the claims 1 to 4, characterized by further including presence message receiving and generating means (5) adapted to receive and generate presence data messages with a data length that is lower than the data length of synthesis data messages.

5. A device according to claim 3 or claim 4, characterized in that said broadcasting module (5, 126) and said stochastic process controller (104) are sensitive for the number of received presence data messages per time unit.

6. A device according to one of the claims 1 to 5, characterized in that the vehicle-sensitive data include the mean velocity of the respective vehicle (19) within a specific track segment.

7. A device according to one of the claims 1 to 6, characterized in that the vehicle-sensitive data include direction indication data of the respective vehicle (19).

8. A device according to one of the claims 1 to 7, characterized by an input module (11) and additional data processing means (43, 47, 48, 49, 90, 91, 92, 93, 94) for processing of additional user-specific data.